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Examination application made in accordance with § 44 PatG

(54) Angle measuring device

(57) According to Fig. 1, an angle measuring device has a support (1) that has a groove (2) on its inside wall. The length of a graduation support (3) provided with a measuring graduation (4) is adapted to the perimeter of the groove (2) so that it can be clipped into the groove (2) without play.

The following details have been obtained from the documents submitted by the applicant.

DE 43 31 668 A1

Description

The invention concerns an angle measuring device according to the preamble of claim 1.

Such angle measuring devices are known and are described on pages 60 and 61 of the book entitled "Digitale Längen- und Winkelmeßtechnik" by Alfons Ernst, published by verlag moderne industrie AG & Co., Landsberg/Lech, 1991, ISBN 3-478-93034-0.

The arrangement illustrated there shows a circular support where a steel strip with an incremental graduation is clamped on to the perimeter of an indexing table. The ends of the strip are welded to clamping blocks that are made so precisely that they only have to be screwed together when fitted to the support – an indexing table, for example.

Another angle measuring device is shown in DE 34 38 550 C1. In this case, an incremental graduation is integrated into the inside wall of a circular support that is an integral part of a ball bearing.

The two solutions illustrated for the graduation arrangement of angle measuring devices have certain disadvantages.

In the case of the first solution, measuring errors may occur at high speed through the centrifugal force.

In the case of the second solution, accommodating the graduation inside the ball bearing creates production problems.

The object of the invention is to create an angle measuring device that does not have the above-mentioned disadvantages, but where the measuring graduation can be made and fitted easily and which works reliably, even with large diameters and high speeds.

This object is achieved through an angle measuring device with the features of claim 1, the device being advantageously designed through the features of the sub-claims.

The invention is described in more detail below with the aid of the drawings, based on an embodiment example, where

Fig. 1 shows a top view of a an angle measuring device before it is fitted in diagrammatic form;

Fig. 2 a cross-section of an angle measuring device according to Fig. 1 and

Fig. 3 such an angle measuring device when fitted

An angle measuring device illustrated in diagrammatic form in the top view in Fig. 1 has a circular, rotatable support 1. A peripheral groove 2 is incorporated in the inside wall of the support 1. A flexible strip 3, preferably a steel strip, has a measuring graduation 4 (illustrated in Fig. 2), which is in the form of an incremental graduation for photo-electric scanning. However, the measuring division may also be designed in coded form and/or for any physical scanning principle.

A scanning device 5, which is statically disposed opposite the rotatable support 1, is provided for scanning the measuring graduation 4.

The flexible strip 3 forms a continuous flexible ring, whose perimeter is matched exactly to the perimeter of the groove 2. Naturally, a non-continuous strip 3 is also feasible, whose ends are fixed in the groove 2.

A particularly advantageous solution consists of matching the length of the strip 3 so accurately to the perimeter of groove 2 that when it is inserted into the groove 2 of the support 1, it clips in with a type of haptic-acoustic feedback effect, and can then be freely released. Fixing with an adhesive, for example, is recommended in order to prevent a relative movement between the strip 3 and the support 1 with dynamic alternating operation.

Other fixing methods are also permitted, but it must be guaranteed that the strip 3 is not exposed to any stresses.

Fig. 1 shows the strip 3 before it is fitted, when the bulge in the "northern" area has to be overcome with the haptic-acoustic feedback effect so that the strip 3, as illustrated in Fig. 3, fits completely, without play, in the groove 2 in the inside wall area of the support 1.

In the ideal case, no further fixing is necessary, but the fixing methods mentioned are possible, but not exhaustive.

Claims

1. Angle measuring device with a flexible strip with a graduation (4) as the graduation support (3), which is attached to a rotatable circular support (1) and a static scanning unit (5), characterised in that the graduation support (3) is disposed on the inside wall of the support (1).

2. Angle measuring device according to claim 1, characterised in that the strip-type graduation support (3) is disposed in a peripheral groove (2) in the inside wall of the support (1).

3. Angle measuring device according to claim 2, characterised in that the graduation support (3) can be clipped into the groove (2).

4. Angle measuring device according to claim 3, characterised in that the length of the graduation support (3) and the perimeter of the groove (2) are matched so that the graduation support (3) is embedded in the groove (2) without play.

5. Angle measuring device according to claim 1, characterised in that the graduation support (3) is attached to the inside wall of the support (1) by bonding, welding, riveting, etc.

6. Angle measuring device according to claim 2, characterised in that the graduation support (3) is fixed in the groove (2) by its own tension, free from extraneous aids.

7. Angle measuring device according to claim 2, characterised in that the graduation support (3) is fixed in the groove (2) by means of extraneous aids.

8. Angle measuring device according to claim 1, characterised in that the graduation support (3) is a flexible steel strip.

9. Angle measuring device according to claim 1, characterised in that the support (1) is an integral part of a rotation bearing.

10. Angle measuring device according to claim 9, characterised in that the rotation bearing is in the form of a sliding, roller or hydraulic bearing.

11. Angle measuring device according to claim, characterised in that the graduation support (3) has a butt joint (6), which is smaller than a graduation period of the measuring graduation (4).

12. Angle measuring device according to claim 1, characterised in that the graduation support (3) has several graduation tracks.

13. Angle measuring device according to claim 1, characterised in that the graduation support (3) is in the form of a continuous strip.

2 pages of drawings attached

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Fig. 1

Fig. 2

Fig. 3